

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)
)
Mitigation of Orbital Debris in the New Space Age) IB Docket No. 18-313

REPLY COMMENTS OF SES AMERICOM, INC. AND O3B LIMITED

SES Americom, Inc. and its affiliate O3b Limited (collectively, “SES”) hereby reply to the comments of other parties regarding the Notice of Proposed Rulemaking in the above-captioned proceeding addressing potential changes to Commission rules governing mitigation of orbital debris.¹ SES’s long tenure in the satellite industry, its operation of both geostationary orbit (“GSO”) and non-geostationary orbit (“NGSO”) spacecraft, and its position as a founding member of the Space Data Association (“SDA”) combine to give SES unique insights into the issues raised in the Notice.² As discussed in the SES Comments and below, SES urges the adoption of orbital debris policies that enhance the safety and security of space operations while providing certainty and uniformity to satellite operators.

I. ASSUMING A ZERO COLLISION RISK BETWEEN MANEUVERABLE SATELLITES AND LARGE OBJECTS WILL SERVE THE PUBLIC INTEREST

If the Commission adopts the proposed National Aeronautics and Space Administration (“NASA”) metric for assessing the risk of collision between NGSO spacecraft and large objects,³ SES supports continuing to assume that risk to be zero or near zero for satellites that actively

¹ *Mitigation of Orbital Debris in the New Space Age*, Notice of Proposed Rulemaking, FCC 18-159 (rel. Nov. 19, 2018) (“Notice”).

² See Comments of SES Americom, Inc. and O3b Limited, IB Docket No. 18-313, filed Apr. 5, 2019 (“SES Comments”) at 1. Unless otherwise indicated, all citations herein are to comments filed on April 5, 2019 in IB Docket No. 18-313.

³ See Notice at ¶ 26 and proposed § 25.114(d)(14)(iv)(A)(1).

monitor conjunction risk and are able to maneuver to avoid collisions, absent evidence to the contrary.⁴ The Commission currently takes this approach in evaluating orbital debris mitigation proposals, as confirmed by recent actions.⁵ Other parties concur that the policy is appropriate and encourages responsible spacecraft design and operating decisions that decrease the possibility of debris generation.⁶

Commenters that object to maintaining this practice appear to misread the Commission's intentions or to ignore the approach's public interest benefits. For example, some parties argue that maneuverability *per se* does not preclude the possibility of collisions, as effective collision avoidance depends on timely, accurate conjunction warnings and the degree of maneuverability that can be achieved.⁷ As an illustration of these issues, Iridium and others highlight the fact that the collision between Cosmos-2251 and Iridium 33 occurred when the latter satellite had propulsion capability.⁸

As SES understands it, however, the Commission does not rely on maneuverability alone to make a risk assessment but instead looks more holistically at an applicant's orbital debris plan, considering both the applicant's showing regarding how it will monitor the space environment and take steps to avoid collisions and any criticisms of the plan presented by other parties.⁹ Moreover, the existing presumption's public interest benefits stem from incentivizing operators

⁴ SES Comments at 2-3.

⁵ See Notice at ¶ 26; *Space Exploration Holdings, LLC*, Order and Authorization, DA 19-342 (IB rel. Apr. 26, 2019) ("SpaceX Order") at ¶ 22.

⁶ Boeing Comments at 12; Telesat Comments at 4.

⁷ Commercial Smallsat Spectrum Management Association ("CSSMA") Comments at 8-9; WorldVu Satellites Limited ("OneWeb") Comments at 16.

⁸ Iridium Comments at 3; OneWeb Comments at 16.

⁹ See Notice at ¶ 26; SpaceX Order at ¶ 22.

to implement measures that minimize the risk of debris, including taking advantage of resources like the SDA to provide advance warning of potential conjunctions¹⁰ and ensuring that their spacecraft are able to quickly take evasive action as needed.¹¹ The fact that best efforts possible at the time were not sufficient to allow the Iridium 33 spacecraft to avoid a collision does not undermine the value of encouraging the use of current best practices by today's NGSO system applicants.

Maintaining the existing presumption is particularly useful given the uncertainty regarding how the Commission could feasibly determine compliance with the proposed collision risk metric. A number of parties observe that neither the NASA standard nor the Notice provides guidance regarding the specific methodology for calculating the probability of collision.¹² NASA, which supports moving away from reliance on a zero collision risk presumption, admits that implementing its collision avoidance metric is "a difficult technical problem" given the number of assumptions that must be made and the importance of validating their

¹⁰ A number of comments stress the value of the SDA in providing a platform that employs flight data supplied by members and other information to supply conjunction assessments and warnings. *See, e.g.*, Comments of Darren McKnight, Integrity Applications, filed Dec. 18, 2018, at 3 (the SDA "is a great approach to be encouraged," as it is critical that space systems communicate quickly and effectively with other operators with which they may have conjunctions); Lockheed Martin Comments at 11 (noting that sharing of essential ephemeris information "has already been established by leading satellite operators through the Space Data Association").

¹¹ *See, e.g.*, Telesat Comments at 4.

¹² *See, e.g.*, Intelsat Comments at 8 ("Absent a specific method to calculate the probability of collision [with large objects], which the NPRM does not provide, the proposal would be hard to meaningfully implement because there is not one universally accepted methodology, and research in this area is ongoing."); SpaceX Comments at 11 (collision avoidance measures proposed in the Notice are "well-intentioned" but "simply are not verifiable by the Commission—or in certain circumstances even by the spacecraft operators themselves—in advance of launch.").

reasonableness.¹³ NASA emphasizes that it “is just beginning to work these problems; and while there are promising leads, a fully-vetted solution ready for implementation . . . is unlikely to be available for some time.”¹⁴

In short, the Commission’s current practice serves the public interest by encouraging best practices, and attempting to more precisely quantify the risks is premature. Accordingly, if the Commission adopts the NASA collision metric, it should continue to presume that the risk that a spacecraft using SDA information or other warning mechanisms and engaged in active avoidance would collide with a large object is effectively zero.

II. THE RECORD SUPPORTS MANDATING THAT ALL NGSO APPLICANTS ADDRESS THE RISK OF COLLISION WITH OTHER SATELLITES

Commenters uniformly support the Commission’s proposal to require all NGSO satellite applicants to identify other satellites using or proposing to use a similar orbit and to describe the coordination measures that will be taken to address collision risk.¹⁵ As ORBCOMM emphasizes, updating Commission rules in this way “will provide greater certainty to both new applicants and incumbent operators” without imposing undue burdens.¹⁶

Most parties also share SES’s view that the Commission should adopt its proposal to mandate that NGSO applicants describe the ability of their systems to maneuver in order to avoid

¹³ NASA Comments at 2.

¹⁴ *Id.* at 3.

¹⁵ See Notice at ¶ 28 and proposed § 25.114(d)(14)(iv)(A)(2); SES Comments at 3; Boeing Comments at iii; Iridium Comments at 3; OneWeb Comments at 7, 18; ORBCOMM Comments at 8; Telesat Comments at 5.

¹⁶ ORBCOMM Comments at 8.

collisions.¹⁷ NASA expressly “supports applicant disclosure of maneuver methods and capabilities, as well as any other mechanisms to mitigate conjunction likelihood,”¹⁸ and CSSMA agrees that “collecting high quality information regarding the abilities of all applicants’ space systems is very much in the public interest and will facilitate the minimization of collisions in space, where and when they can be avoided.”¹⁹ The sole dissenting voice comes from LeoSat, which argues that “information relating to satellite maneuverability is proprietary and competitive in nature” and should not be required to be disclosed.²⁰ Concerns about data sensitivity, however, do not outweigh the strong public interest in ensuring that the Commission and potentially affected parties have access to sufficient information to evaluate whether a proposed system can effectively avoid debris-creating collisions.

III. THE COMMISSION SHOULD UPDATE ITS RULES TO FACILITATE ORBIT RAISING OF NGSO SPACECRAFT

SES and other operators endorse revisions to Section 25.282 to authorize telemetry, tracking, and command (“TT&C”) functions for post-launch orbit raising for NGSO as well as GSO systems.²¹ In addition, there is substantial support for including in Section 25.282 language comparable to that of Section 25.283(b) to make clear that such TT&C operations would be entitled to interference protection if coordinated with potentially affected satellite networks.²²

¹⁷ See Notice at ¶ 39 and proposed § 25.114(d)(14)(iv)(A)(3); SES Comments at 3; CSSMA Comments at 12; Iridium Comments at 6; NASA Comments at 5; OneWeb Comments at 13; SpaceX Comments at 13; Telesat Comments at 6; The Aerospace Corporation Comments at 12.

¹⁸ NASA Comments at 5.

¹⁹ CSSMA Comments at 12.

²⁰ LeoSat Comments at 5.

²¹ Notice at ¶ 70; SES Comments at 4; Boeing Comments at 36; Intelsat Comments at 4; Lockheed Martin Comments at 16.

²² Notice at ¶ 71; SES Comments at 4; Boeing Comments at 36; Intelsat Comments at 4-5; Lockheed Martin Comments at 16; ORBCOMM Comments at 9; Viasat Comments at 7.

SES agrees with Viasat that, consistent with current practice, the Commission should permit coordination of orbit raising “on an informal basis (*i.e.*, through e-mail correspondence rather than a formal, written agreement),” as this “process has worked well, and there is no need to impose specific parameters or requirements for the coordination process in this context.”²³ The same rationale for making these changes also justifies extending streamlined treatment to TT&C operations needed to support orbit-raising of NGSO spacecraft at the end of the satellite’s mission, as requested by SES.²⁴

IV. AMATEUR AND EXPERIMENTAL SYSTEMS SHOULD BE REQUIRED TO PROVIDE EPHEMERIS DATA ABSENT SPECIAL CIRCUMSTANCES

SES and other parties emphasize that amateur and experimental NGSO satellites should be subject to the same requirements applicable to commercial systems.²⁵ Accordingly, the Commission should not adopt its proposal to exempt amateur and experimental NGSO systems from the requirement to maintain and share ephemeris data.²⁶ In instances where the specific circumstances of a proposed amateur or experimental mission justify it, waivers of the ephemeris requirements can be granted on a case-by-case basis.²⁷ A blanket exemption, however, is not warranted, particularly given that amateur and experimental satellites “often have longer

²³ Viasat Comments at 7-8. This approach would address Eutelsat’s concern that formal coordination of orbit-raising maneuvers should not be required. *See* Eutelsat Comments at 6.

²⁴ SES Comments at 4.

²⁵ SES Comments at 5; CSSMA Comments at 23; Comments of Astroscale Holdings *et al.* (“Global NewSpace Operators”) at 18; ORBCOMM Comments at 9; Telesat Comments at 11.

²⁶ Notice at ¶ 84.

²⁷ *See* SES Comments at 4; CSSMA Comments at 23; Global NewSpace Operators Comments at 18.

lifetimes” than other small spacecraft,²⁸ increasing the period during which they could become a source of harmful debris.

V. THE RECORD SUPPORTS SIA’S RECOMMENDATIONS

As a member of the Satellite Industry Association (“SIA”), SES concurs with the positions set forth in SIA’s comments on the Notice,²⁹ and there is broad support in the record for SIA’s proposals:

- Orbital debris policy should be developed on a coordinated, consistent basis, taking into account the expertise of all relevant federal agencies through an interagency working group.³⁰
- License extensions for GSO satellites should be considered on a case-by-case basis rather than strictly limited to 5 year increments to provide needed flexibility and avoid situations that might preclude an operator from providing service continuity.³¹
- NGSO operators should be required to commit to taking steps to avoid a collision, but the Commission should revise its rule language to allow greater flexibility regarding the specific actions to be taken.³²

²⁸ Radio Amateur Satellite Corporation Comments at 3; *see also* ARRL Comments at 6.

²⁹ *See* SES Comments at 2; SIA Comments.

³⁰ *See* SIA Comments at 3-4; Consortium for Execution of Rendezvous and Servicing Operations (“CONFERS”) Comments at 3; CSSMA Comments at 3-4; Duke Science Regulation Lab Comments at 6-7; EchoStar Comments at 4; Global NewSpace Operators Comments at 21-22; Intelsat Comments at 2-3; Lockheed Martin Comments at 5; Maxar Comments at 7-8, 11; OneWeb Comments at 2; ORBCOMM Comments at i; Space Logistics Comments at 6.

³¹ *See* SIA Comments at 6-7; AT&T Comments at 4; EchoStar Comments at 7; Eutelsat Comments at 4-5; Intelsat Comments at 9-11; Lockheed Martin Comments at 15; Telesat Comments at 9. *But see* Viasat Comments at 8 (endorsing the proposed five year limit without providing supporting analysis or discussion).

³² *See* SIA Comments at 7-8; Intelsat Comments at 6; LeoSat Comments at 4; Lockheed Martin Comments at 12; NASA Comments at 5; Telesat Comments at 6.

- The Commission should not impose an indemnification requirement, as it is not justified by the facts, not supported by the law, and not consistent with the Commission's objectives of promoting United States leadership in space.³³

VI. CONCLUSION

For the foregoing reasons and those set forth in the SES Comments, SES respectfully requests that any actions by the Commission in this proceeding reflect the need for regulatory certainty for spacecraft operators, avoid imposing unnecessary constraints on operator flexibility, and promote a safe, sustainable space environment.

Respectfully submitted,

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³³ See SIA Comments at 8-10; AT&T Comments at 6; Boeing Comments at v, 37-38; CSSMA Comments at 20; EchoStar Comments at 7; Intelsat Comments at 12-15; LeoSat Comments at 9; Lockheed Martin Comments at 18-19; ORBCOMM Comments at 19; Sirius XM Comments at 9; Space Logistics Comments at 3, 13; Spaceflight Comments at 6; Telesat Comments at 11.